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# Independent Evaluation of a Multidisciplinary Rehabilitation Program for Chronic Low Back Pain

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Severe chronic low back pain was diagnosed in 236 patients by one physician and they were referred to the University of Miami Comprehensive Pain and Rehabilitation Center (UMCPRC) over a 5-year period for an intensive 4-week inpatient treatment program. Of these 143 (61%) were able to be contacted by telephone and given a structured interview designed for the study. The average time elapsed at follow-up from referral for all patients was 22.5 months. Outcome was measured in the following terms: current levels of pain, percent decrease in pain, subsequent health care utilization, activities of daily living, and attitudes toward treatment. After completion of the interview, the McGill Pain Questionnaire and the Oswestry Low Back Pain Disability Questionnaire were sent to the patients. The patients fell into five groupings: Group 1—participants in the UMCPRC program (n = 39); Group 2—those whose participation was not approved by insurance (n = 30); Group 3—those who declined participation (n = 46); Group 4—participants in other programs (n = 14); Group 5—dropouts (n = 14). The five groups were not meaningfully different with regard to prereferral demographics. Interestingly, Group 1 patients exhibited significantly greater prereferral pain and unemployment levels. Despite this, at follow-up significantly more Group 1 members were employed and they exhibited a greater percent decrease in pain as compared to the nonparticipant groups. Returned McGill and Oswestry Questionnaires mirrored these findings. Group 1 members also demonstrated significantly lower rates of subsequent health care utilization, i.e., physician visits, hospitalizations, and surgery than the nonparticipant groups. In conclusion, independent evaluation suggests that the type of program given at UMCPRC is effective for the treatment of chronic intractable low back pain. Future directions are briefly discussed. (*Neurosurgery* 25:877–883, 1989)

Key words: Chronic low back pain, Conservative care, Failed-back syndrome, Pain rehabilitation program

## INTRODUCTION

Low back pain is the most expensive benign disease in the United States. Experts estimate that "fully 1% of the population is considered totally and permanently disabled by chronic back problems" (6). Surgery is an appropriate solution for only a small minority (1 to 3%) of all individuals with low back pain (5, 10). The great majority of patients who seek medical care for this problem are offered one or more conservative treatments depending on the philosophical and theoretical biases of the treating physician. One common rehabilitation approach is to have the patients engage in a program of exercise and stretching, either on their own, or under the direction of a physical therapist (16). Another rehabilitation approach that is proliferating nationally is the multidisciplinary pain clinic. These programs vary greatly in terms of staffing, treatment modalities offered, and availability of inpatient and/or outpatient facilities (9). There are considerable disparities in cost among these various conservative approaches.

Reported success rates for rehabilitation programs are very high (4, 9, 16). One recent prospective study of a rehabilitation program in Texas claimed that 87% of its patients were working 2 years after discharge, while only 41% of a no-treatment comparison group were employed (6). Problematically, all of the reported outcome data have been generated by the programs themselves. In other words, there has been no evaluation of such programs by individuals not accountable or beholden to the program being evaluated. This potential threat to the validity of prior outcome studies is a serious problem for the scientific basis of conservative treatment for chronic pain syndromes. In fact, the Institute of Medicine's 1987 report on pain and disability recommended that independent systematic review of pain rehabilitation programs be given the highest priority in future research (10). This study specifically addresses this gap in knowledge.

The University of Miami Comprehensive Pain and Rehabilitation Center (UMCPRC) administered by the Department of Neurological Surgery is a well-established multidisciplinary pain clinic. The emphasis at UMCPRC is on delivery of an intense, highly integrated, aggressive program of physical medicine and therapy, ergonomics, and vocational rehabilitation. Job simulation and work conditioning are incorporated so that patients who complete the program are fit for work. UMCPRC also provides psychologically based therapies, including biofeedback and stress management. The UMCPRC program is an inpatient program which encompasses 6 days a week over a 4-week period with 10 hours of activity/therapy per day. Detoxification is ordered for every patient and is accomplished within the first 5 to 10 days. The UMCPRC program is described in detail by Rosomoff et al. (12).

Previewed briefly, patients referred for treatment specifically at UMCPRC were given a structured interview by telephone. After completion of the interview, the McGill Pain Questionnaire and the Oswestry Low Back Pain Disability Questionnaire were sent to the patients. Outcome was evaluated in the following terms: current levels of pain, percent decrease in pain, subsequent health care utilization, employment, and activities of daily living. Interpretation of outcome is augmented by comparing patients who actually attended UMCPRC (Group 1) with those who did not attend because their participation was not approved by insurance (Group 2), they declined to participate (Group 3), they went to other programs (Group 4), or they dropped out (Group 5). Information on individuals who could not be contacted are pre-

sented where possible (Group 6). In addition, the data permitted evaluation of the referral system, as well as evaluation of patient attitudes toward treatment.

## METHOD

### *Procedure and measures used*

Patients with back pain who were seen at the Neurosurgery Outpatient Clinic at the University of Florida by a neurosurgical spine specialist (GWS) during a 5-year period from January 1, 1983, to January 5, 1988, and subsequently referred to UMCPRC for rehabilitation were contacted for this study. No indigent patients were seen in this clinic. Patients were identified by an exhaustive search of the medical records of all individuals seen by the spine specialist. Charts of 236 patients meeting this simple criterion were pulled. Diagnoses, previous operations, and treatment referral to UMCPRC were identified and recorded from the specialist's original referral reply contained in the chart. In addition, demographic data from the hospital registration face-sheet were entered into the database at this time.

At least six attempts at contacting each patient by telephone on three different days were made. After the patient agreed to speak with the research assistant (AS or LK), a structured interview designed for the study was conducted. The average time elapsed from referral to the interview was 22.2 months (SD = 12.8) for the program participants and 22.7 months (SD = 9.5) for program nonattenders.

The interview inquired about demographic information not included in the face-sheet, current and previous levels of pain, employment, global functional level, as well as previous and subsequent medical treatment. Questions about employment and global level of functioning followed the rating system developed by Prolo et al. (11). Evidence that this rating system can be used reliably was presented by Cassisi et al. (1).

In the case of patients who attended the UMCPRC (Group 1), the interview also inquired about the patient's satisfaction and attitudes toward treatment. For patients who did not attend UMCPRC the interview also inquired about the reasons for noncompliance with the referral recommendation.

Upon completion of the interview all patients were mailed the McGill Pain Questionnaire (7) and the Oswestry Low Back Pain Disability Questionnaire (2) with a stamped and addressed return envelope. The McGill Pain Questionnaire has been validated extensively and provides information on dimensions of pain including sensation, affective reaction, and evaluative appraisal (7). The Oswestry Low Back Pain Disability Questionnaire briefly assesses 10 areas of activities of daily living, e.g., lifting, personal hygiene, etc.

### *Data entry, management, and analysis*

All data were coded on forms during the interview and entered into an IBM AT-compatible personal computer with the IBM-standard database software *R:base for DOS* (8). All analyses were performed using the *Statistical Analysis System for Personal Computers*, version 6.03 (13). Statistical comparisons among groups were undertaken in the following manner. Data that were coded categorically were contrasted via chi-square tests (CS), ordinal data were compared with Kruskal-Wallis analysis of variance by rank (KW), and interval data were tested with analysis of variance ($F$) (13). All tests were two-tailed and the significance level was set a priori at $P < 0.05$.

### *Demographic profile of sample*

Of the 236 patients originally referred to UMCPRC, 143 patients were interviewed and 8 declined. This amounted to a contact rate of 61% of the population. The demographic profile of the sample is displayed in Table 1.

No significant differences among the groups emerged in age, sex, marital status, ethnic group, worker's compensation, or education. Group 1 was significantly older than Group 6 ($F = 3.82$, df = 1/114, $P = 0.05$). Seventy-five percent of Group 1 patients were married, 90% were white, 75% were sponsored by worker's compensation, and 79% had 12 years of education of more.

### *Pretreatment medical and functional status*

Questions about medical and functional status prior to referral to UMCPRC were asked during the interview as well. These included prereferral levels of pain intensity, pain duration, employment, as well as functional status and litigation status.

The pretreatment medical and functional status of the sample is presented in Table 2. Diagnoses were arranged into seven general categories following Sypert's 1986 organizational scheme and then tallied (14). In 78% of Group 1 patients the initial primary diagnosis was myofascial pain (15, 16). No significant differences among groups were obtained in the frequency of diagnoses.

The prereferral levels of pain intensity were contrasted and Group 1 patients exhibited a significantly greater degree of pain in the month prior to referral than Group 2 (KW = 4.52, df = 1, $P = 0.03$) and Group 3 patients (KW = 7.53, df = 1, $P = 0.006$). The average pain intensity that Group 1 patients reported experiencing in the month prior to referral was 8.3 on a scale of 1 to 10 with 10 being the most intense pain possible. Groups 2 and 3 patients reported an average of 7.5 and 7.2, respectively.

No significant differences emerged among groups in prereferral pain duration rating. The average duration of pain was from 2 to 5 years for all groups. No significant differences emerged among groups in the number of prior operations. Group 1 patients had an average of 1.3 prior operations.

Prereferral employment was contrasted and significantly fewer Group 1 patients were employed than Group 2 (CS = 4.54, df = 1, $P = 0.03$) or Groups 2 and 3 combined (CS = 4.57, df = 1, $P = 0.03$). In addition, the average level of employment of Group 1 patients was significantly lower than that for Group 2 (KW = 4.5, df = 1, $P = 0.03$). No significant differences emerged among groups in the global measure of functioning or in litigation status.

## RESULTS

### *Interview outcome measures*

The interview outcome measures are presented by group in Table 3.

*Pain.* There were no significant differences among the groups in absolute ratings of pain intensity. The average pain intensity rating for Group 1 patients was 5.9 in the month before the interview.

There was a significant difference between Group 1 and Group 2 (KW = 9.38, df = 1, $P = 0.002$) and Group 1 and Group 3 patients (KS = 08, df = 1, $P = 0.02$) in the percent decrease in pain intensity from prereferral levels. The average decrease in pain for Group 1 was 27%, whereas the other groups ranged from 0 (Group 4) to 14% (Group 5).

TABLE 1
*Demographic Profile of Sample*[a]

| | Group 1 UMCPRC Participants | Group 2 Not-Approved | Group 3 Declined | Group 4 Other Program Participants | Group 5 Drop-Out | Group 6 No Contact |
|---|---|---|---|---|---|---|
| Number | 39 | 30 | 46 | 14 | 14 | 85 |
| % of Sample | 27 | 21 | 32 | 10 | 10 | |
| Mean Age (SD) | 45.9 (14.3) | 45.5 (11.5) | 47.3 (11.1) | 45.4 (10.8) | 42.6 (11.3) | 41.5 (9.8)[b] |
| Sex (%) | | | | | | |
| Male | 69 | 70 | 54 | 64 | 64 | 73 |
| Female | 31 | 30 | 46 | 36 | 36 | 27 |
| Marital status (%) | | | | | | |
| Married | 75 | 74 | 78 | 79 | 86 | 75 |
| Single | 17 | 15 | 10 | 14 | 7 | 16 |
| Divorced | 6 | 4 | 12 | 0 | 0 | 7 |
| Widowed | 3 | 7 | 0 | 7 | 7 | 1 |
| Ethnic group (%) | | | | | | |
| White | 90 | 92 | 96 | 92 | 92 | 89 |
| Black | 10 | 8 | 4 | 8 | 8 | 11 |
| Worker's compensation (%) | | | | | | |
| Yes | 74 | 62 | 63 | 86 | 71 | 67 |
| No | 26 | 38 | 37 | 14 | 29 | 33 |
| Education (%) | | | | | | |
| Less than high school | 21 | 39 | 38 | 39 | 14 | |
| High school | 32 | 19 | 21 | 23 | 64 | |
| College | 37 | 38 | 33 | 23 | 21 | |
| Graduate | 11 | 4 | 7 | 15 | 0 | |
| Mean years (SD) | 13.0 (2.8) | 11.9 (3.5) | 12.2 (2.9) | 12 (3.9) | 11.9 (1.9) | |

[a] Number of referrals to UMCPRC (total charts pulled): 236; Number of patients who declined to be interviewed: 8; Total number of interviews: 143; Contact rate (% of population sampled): 61. Group 1: UMCPRC program participants; Group 2, not approved by insurance; Group 3, declined to participate; Group 4, participants in other programs; Group 5, dropouts; Group 6, no contact. Percentages may not add exactly to 100 because of rounding error.

[b] Significantly different from Group 1 (see text for *P* values).

TABLE 2
*Prereferral Medical and Functional Status*[a]

| | Group 1 | Group 2 | Group 3 | Group 4 | Group 5 | Group 6 |
|---|---|---|---|---|---|---|
| Initial primary diagnosis (%) | | | | | | |
| Myofascial pain | 78 | 83 | 89 | 71 | 86 | 75 |
| Inflammatory pain | 0 | 0 | 0 | 0 | 0 | 3 |
| Neural compressive disorder | 0 | 0 | 0 | 7 | 7 | 6 |
| Mechanical pain | 0 | 0 | 0 | 0 | 0 | 0 |
| Neuropathic pain | 3 | 7 | 0 | 0 | 0 | 1 |
| Psychosocial disorder | 0 | 0 | 4 | 7 | 0 | 3 |
| Mixed | 19 | 10 | 7 | 14 | 7 | 12 |
| Pain | | | | | | |
| Mean pain rating (SD) | 8.3 (1.9) | 7.5 (1.7)[b] | 7.2 (1.8)[b] | 7.7 (2.4) | 8.1 (1.4) | |
| Mean pain duration rating (yr) | 2–5 | 2–5 | 2–5 | 2–5 | 2–5 | |
| Health care utilization: | | | | | | |
| Prior surgery (%) | | | | | | |
| Yes | 49 | 61 | 56 | 57 | 64 | 51 |
| No | 51 | 39 | 44 | 43 | 36 | 49 |
| Mean (SD) | 1.3 (1.4) | 1.4 (1.4) | 1.7 (1.7) | 1.7 (1.4) | 1.1 (1.2) | 1.4 (0.7) |
| Employment | | | | | | |
| Employed (%) | | | | | | |
| Yes | 13[c] | 21 | 29[b] | 21 | 14 | |
| No | 87[c] | 79 | 71[b] | 79 | 86 | |
| Mean employment level (SD) | 1.9 (0.7) | 2.3 (1.0)[b] | 2.3 (1.3) | 2.1 (0.8) | 2.0 (0.8) | |
| Activities of daily living | | | | | | |
| Mean functional level (SD) | 1.7 (0.6) | 2.0 (0.7) | 1.9 (0.9) | 1.8 (0.7) | 1.8 (0.4) | |
| Litigation status (%) | | | | | | |
| None | 67 | 61 | 63 | 62 | 46 | |
| Pending | 18 | 32 | 19 | 31 | 31 | |
| Settled | 15 | 7 | 19 | 8 | 23 | |

[a] For explanation of groups, see Table 1. Percentages may not add exactly to 100 because of rounding error.

[b] Significantly different from Group 1 (see text for *P* values).

[c] Significantly different from Groups 2 and 3 combined (see text for *P* values).

TABLE 3
*Interview Outcome Measures*[a]

| | Group 1 | Group 2 | Group 3 | Group 4 | Group 5 |
|---|---|---|---|---|---|
| Pain | | | | | |
| Mean pain rating (SD) | 5.9 (2.6) | 6.8 (2.4) | 6.1 (2.3) | 5.8 (2.2) | 6.8 (2.4) |
| Mean % pain decrease (SD) | 27 (32) | 3 (28)[b] | 11 (35)[b] | 0 (103) | 14 (29) |
| Subsequent health care use | | | | | |
| Physician visits | | | | | |
| Mean (SD) | 1.1 (1.5)[c] | 1.4 (1.5) | 1.8 (1.8)[b] | 1.4 (1.5) | 1.8 (1.7) |
| % with visits | 54[c] | 70 | 78[b] | 71 | 64 |
| Hospitalizations | | | | | |
| Mean (SD) | 0.3 (0.8)[c] | 0.4 (0.6) | 0.7 (1.2) | 0.9 (1.6) | 0.4 (0.8) |
| % with visits | 13[c] | 31 | 36[b] | 36 | 28 |
| Surgery | | | | | |
| Mean (SD) | 0.2 (0.6) | 0.2 (0.4) | 0.5 (1.3)[b] | 0 (0) | 0.1 (0.4) |
| % with surgery | 8 | 17 | 31[b] | 0 | 14 |
| Current employment | | | | | |
| Employed (%) | | | | | |
| Yes | 69 | 41[b] | 39[b] | 64 | 29 |
| No | 31 | 59[b] | 61[b] | 36 | 71 |
| Mean employment level (SD) | 3.3 (1.2) | 2.4 (1.0)[b] | 2.7 (1.3)[b] | 2.9 (1.0) | 2.6 (1.0) |
| Activities of daily living | | | | | |
| Mean functional level (SD) | 2.7 (1.1)[c] | 2.0 (0.9)[b] | 2.3 (1.3)[b] | 2.3 (1.0) | 1.9 (0.7) |

[a] For explanation of groups see Table 1. Percentages may not add exactly to 100 because of rounding error.
[b] Significantly different from Group 1 (see text for *P* values).
[c] Significantly different from Groups 2 and 3 combined (see text for *P* values).

*Subsequent health care utilization.* Fifty-four percent of Group 1 patients had subsequent physician visits. This was significantly fewer patients than Group 3 (CS = 6.41, df = 1, $P = 0.01$) or Groups 2 and 3 combined (CS = 5.99, df = 1, $P = 0.01$). The average number of subsequent physician visits for Group 1 patients was 1.1. This was significantly fewer visits than Group 3 (KW = 5.26, df = 1, $P = 0.02$) or Groups 2 and 3 combined (KW = 4.42, df = 1, $P = 0.03$).

Thirteen percent of Group 1 patients had subsequent hospitalizations. This was significantly fewer patients than Group 3 (CS = 4.65, df = 1, $P = 0.03$) or Groups 2 and 3 combined (CS = 4.59, df = 1, $P = 0.03$). The average number of hospitalizations for Group 1 patients was 0.3. This was significantly fewer visits than Group 3 (KW = 5.62, df = 1, $P = 0.02$) or Groups 2 and 3 combined (KW = 5.15, df = 1, $P = 0.02$).

Eight percent of Group 1 patients reported subsequent surgery. Fewer patients from Group 1 had surgery than from Group 3 (CS = 4.04, df = 1, $P = 0.04$). Comparing program participants (Groups 1 and 4) with nonparticipants (Groups 2 and 3) revealed that significantly fewer participants had surgery than nonparticipants (CS = 5.89, df = 1, $P = 0.02$). The average number of subsequent operations for Group 1 patients was 0.2. This represented a significantly fewer number of operations than Group 3 (KW = 3.85, df = 1, $P = 0.05$). Again, an overall comparison indicated that program participants had significantly fewer operations than nonparticipants (KW = 5.73, df = 1, $P = 0.02$).

*Current employment and global rating of functioning.* Sixty-nine percent of Group 1 members were employed at follow-up. This was significantly more than Group 2 (CS = 5.28, df = 1, $P = 0.02$), Group 3 (CS = 7.68, df = 1, $P = 0.006$), and Group 5 (CS = 7.02, df = 1, $P = 0.008$). The level of employment for Group 1 was also significantly greater than that for Group 2 (KW = 8.72, df = 1, $P = 0.003$), Group 3 (KW = 6.46, df = 1, $P = 0.01$), or Group 5 (KW = 4.86, df = 1, $P = 0.03$).

The global level of functioning was significantly higher in Group 1 patients when compared to Group 2 (KW = 6.59, df = 1, $P = 0.01$), Groups 2 and 3 combined (KW = 5.74, df = 1, $P = 0.01$), and Group 5 (KW = 5.74, df = 1, $P = 0.01$).

*Questionnaire outcome measures*

The return rate for the questionnaires was 54% for Group 1 and 50% for Groups 2 and 3, who were collapsed into a Nonparticipant Group for all analyses. The questionnaire outcome measures are presented in Table 4.

*McGill Pain Questionnaire.* Group 1 reported an average score of 16.7 on the Sensory scale of the McGill Pain Questionnaire as compared to a score of 21.7 for the Nonparticipant Group. Higher scores would indicate a greater degree of actual perception of pain. This was a significant difference ($F = 4.63$, df = 1/57, $P = 0.03$).

Group 1 reported an average score of 3.1 on the Affective scale as compared to a score of 3.5 for the Nonparticipant Group. Higher scores would indicate a greater degree of emotional involvement with the pain stimulus. There was no significant difference in this measure between the groups.

Group 1 reported an average score of 1.6 on the Evaluative scale as compared to a score of 2.4 for the Nonparticipant Group. Higher scores would indicate a greater degree of cognitive appraisal of the pain stimulus. This was a significant difference ($F = 4.74$, df = 1/57, $P = 0.03$).

The Total score for Group 1 on the McGill Pain Questionnaire was 29.5 as compared to 36.3 for the Nonparticipant Group. This was not significant. The average number of pain words endorsed for Group 1 was 12.1 as compared to 14.5 for the Nonparticipant Group. This too was not significant.

*Oswestry low back pain disability questionnaire.* Comparisons between Group 1 and the Nonparticipant Group were made for the activities listed on the Oswestry Low Back Pain Disability Questionnaire. Group 1 patients reported significantly less impairment in lifting heavy weights than the Nonparticipant Group (KW = 7.33, df = 1, $P = 0.007$). There were no other significant differences between the groups on

TABLE 4
*Questionnaire Outcome Measures*[a]

| | Group 1 | Groups 2 and 3 |
|---|---|---|
| Pain: McGill Pain Questionnaire | | |
| Mean sensory score (SD) | 16.7 (9.6) | 21.7 (7.4)[b] |
| Mean affective score (SD) | 3.1 (3.7) | 3.5 (3.1) |
| Mean evaluative score (SD) | 1.6 (1.6) | 2.4 (1.1)[b] |
| Mean total score (SD) | 29.5 (17.1) | 36.3 (13.6) |
| Mean number of words checked (SD) | 12.1 (5.1) | 14.5 (5.4) |
| Activities of daily living: Oswestry Low Back Pain Questionnaire | | |
| Mean lifting score (SD) | 2.5 (1.5) | 3.5 (1.0)[b] |
| Mean total score (SD) | 42.9 (18.5) | 48.2 (17.3) |

[a] Group 1: UMCPRC Program Participants; Groups 2 and 3: Program nonpartiicpants.
[b] Significantly different from Group 1 (see text for *P* values).

this measure. The total Oswestry score for Group 1 was 42.9 as compared to a score of 48.2 for the Nonparticipant Group.

*Attitudes toward treatment.* Seventy-four percent of Group 1 patients reported that the UMCPRC program was helpful for their condition. Eighty-six percent of Group 4 reported that the program they attended was helpful, whereas only 15% of Group 5 patients reported a positive evaluation in those terms.

Seventy-nine percent of Group 1 patients reported that they were satisfied with the way they were treated at the program. Seventy-nine percent of Group 4 patients also reported that they were satisfied with the way they were treated. Only 46% of Group 5 patients reported satisfaction.

Seventy-four percent of Group 1 patients said they would recommend that a friend who had a similar condition go to UMCPRC. Sixty-nine percent of Group 4 patients said they would make that recommendation, whereas only 31% of Group 5 patients would make that recommendation.

*Reasons for noncompliance with referral recommendation.* The five groupings of patients may be interpreted to reflect the common patterns of response to referral for treatment at a specific pain rehabilitation program. The percentage of the sample that each group represents is displayed in Table 1. Only 27% of the patients specifically and expressly referred to UMCPRC actually attended and completed the treatment program, 21% reported that they did not attend because third-party insurance would not support the treatment, 32% reported that they declined to participate, 10% were diverted to another program, and 10% were admitted to UMCPRC or another program and dropped out.

Nonacceptance by UMCPRC did not appear to be a factor. In reviewing the 236 charts only three letters from UMCPRC suggesting the referral was inappropriate were found. Patients sometimes confused nonsupport by insurance or worker's compensation with rejection by UMCPRC.

## DISCUSSION

The empirical literature concerning the effectiveness of comprehensive pain rehabilitation programs is relatively small and ambiguous. The absence of persuasive and objective support reflects the difficulty of establishing the efficacy of a multifaceted treatment package for a complex medical *and* socioeconomic problem. The results of this study answer the controversial question whether a pain rehabilitation program would be found to be effective, if examined by an independent team of specialists. The results unequivocally indicate that the conditions of participants in the UMCPRC program were significantly improved in virtually every domain assessed as compared to patients who did not participate in a program.

### *Summary of patient sample*

The demographic variables of the groups are remarkably similar. The average age difference of UMCPRC program participants and the patients not able to be contacted was statistically significant; however, this difference (45.9 and 41.5) is not likely to be developmentally significant and thus should not affect inferences based on the sample. This difference probably results from the inverse relationship between age and mobility. That is, the younger an individual the more likely he or she is to move within a 2-year period, and the more difficult to locate.

The average duration of pain was from 2 to 5 years for all groups. This indicates that the population sampled meets the International Association for the Study of Pain criteria for chronicity (2). Taken together, the prereferral medical and functional status indicates that the population studied was representative of severe chronic back pain. Although all groups exhibited an extreme degree of medical and functional impairment before referral, the conditions of Group 1 patients were even more severe in several domains. This was especially demonstrated in pain ratings and employment levels. Therefore, if biases are contained in the groupings, they would work *against* positive outcomes in Group 1 patients.

The similarity of groups in the demographic and prereferral variables, the fact that diagnoses and referrals of the entire population were made by one physician, and the large number of subjects interviewed support the methodological approach taken in this study. That is, differences that emerged among the groups can reasonably or arguably be attributed to treatment. Of course, ultimate arbitration on the issue of pain rehabilitation program effectiveness awaits the type of studies called for in the future directions section below.

### *Summary of outcome measures*

The findings presented here both replicate and extend the findings of Mayer et al. (6) and Rosomoff et al. (12). That is, UMCPRC program participants were found to be superior to nonparticipants on measures of socioeconomic impact, but additionally they were found to be significantly more improved on "quality-of-life criteria." For example, participants reported a significantly greater decrease in pain as compared to nonparticipants and participants in other programs. Figure 1 presents the percent decrease in pain by group. Participants also scored lower on the Sensory and Evaluative scales of the McGill Pain Questionnaire.

UMCPRC program participants utilized health care services much less frequently than nonparticipant groups. There were significantly fewer physician visits and hospitalizations for participants than for the nonparticipant groups.

Eight percent of UMCPRC program participants had subsequent surgery compared to 17 and 31% of Groups 2 and 3, respectively. No individual from Group 4 had subsequent surgery (Fig. 2). In addition, the rate of subsequent surgery was significantly lower for the pain rehabilitation groups combined (0.12) than for the nonparticipant groups combined (0.39). Extrapolating from these surgery rates obtained, there would be 27 fewer operations per 100 patients attending pain rehabilitation programs than for those not attending.

There were substantial benefits to UMCPRC program participants in measures of socioeconomic impact. That is, 69% of participants were employed at follow-up as opposed to 40%

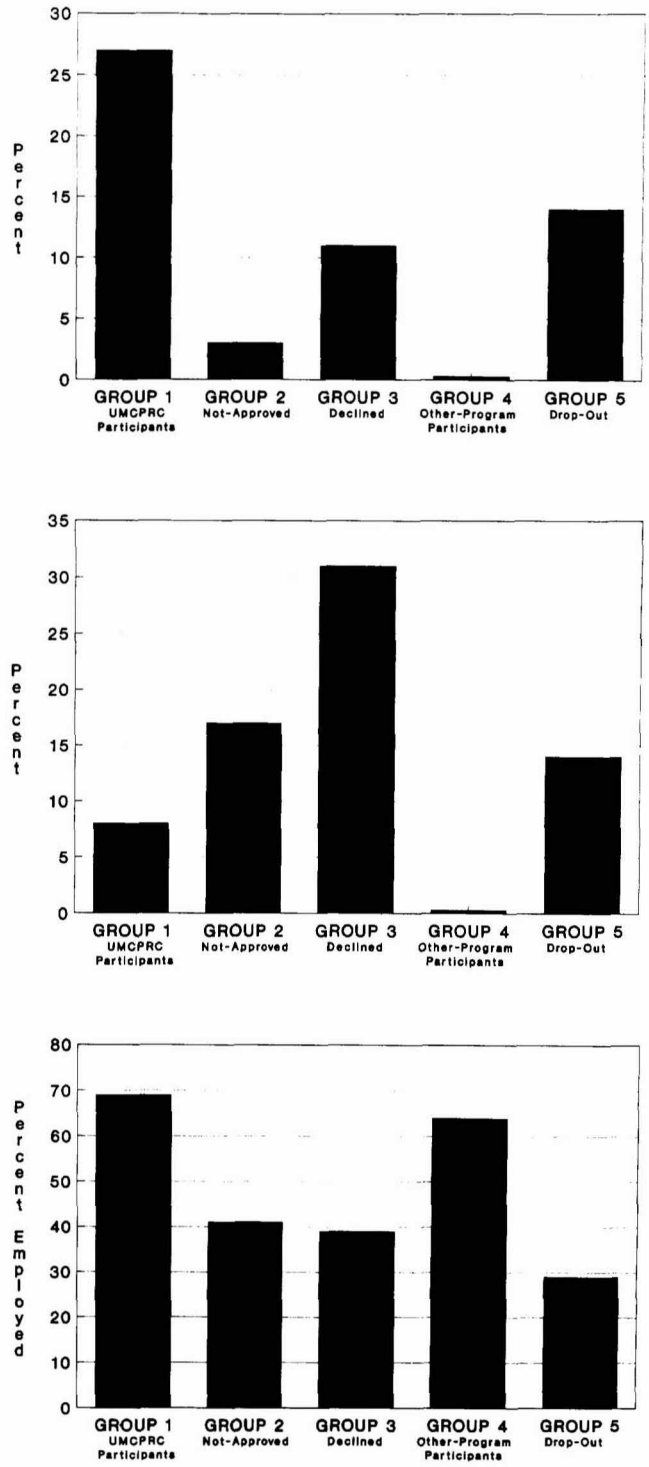


FIG. 3. Percentage of patients employed.

for the nonparticipant groups. The employment rate by group at follow-up is presented in Figure 3.

The global rating of functioning was significantly higher in UMCPRC program participants than in nonparticipants. The self-rating of lifting from the Oswestry Low Back Pain Disability Questionnaire was significantly less impaired in participants than in nonparticipants.

The patient attitudes toward treatment at UMCPRC were generally positive. Seventy-four percent of participants felt that the program was helpful, and 79% would recommend that a friend with a similar problem attend. Patients who attended other programs reported roughly equivalent attitudes; therefore, these findings were not compared statistically.

*Future directions*

Ultimately, a randomized control-group design conducted by an independent team of specialists will be the only conclusive approach to determine the effectiveness of comprehensive pain rehabilitation programs (10). Research questions will not end there because the task of how to make these programs efficacious if they are found lacking or how to improve on their effectiveness will remain.

One strategy would be to assign patients randomly to various programs with differing treatment orientations, such as zero medication tolerance versus an individually tailored approach. Comparisons could also be made between inpatient as opposed to outpatient programs, or programs that are local versus remote to the patient and the family. Another strategy would be to vary components within a program over treatment cycles to determine the incremental contribution of each part. This latter approach would help identify the "active ingredients" of programs. Those in charge of programs in turn should not view ongoing evaluations by referring physicians as a threat, but as part of an evolutionary process and actively incorporate findings when deemed conclusive.

*Conclusion*

The independently obtained findings of this study suggest that an appropriately designed comprehensive multidisciplinary pain rehabilitation program is an effective way to treat chronic low back pain.

## ADDENDUM

Shortly after this article was submitted, these data were presented by G. W. Sypert and J. E. Cassisi at the Annual Meeting of the American Association of Neurological Surgeons, held in Washington, DC, in April 1989. One comment from the audience is noted and addressed here. A suggestion was offered that the outcome measures from Group 5 patients, those who dropped out, should be included with Groups 1 or 4, the treatment groups. An analogy was made between this situation and an evaluation of surgical outcome: if a surgeon begins a lumbar microdiscectomy and shortly after incision the patient has a hypotensive crisis resulting in an aborted procedure, that patient is counted as a failure for microdiscectomy. This operation is coded as a failure even though the complication had to do with the risks associated with surgery in general and not with lumbar discectomies per se.

In response to this criticism the outcome measures were reorganized including the dropout patients in their respective treatment groups. Eight of these patients went to UMCPRC and 6 were participants in other programs. The average reported length of stay for dropouts from the UMCPRC program was 12 days, and the average length of participation for dropouts from other programs was 95 days.

Reorganizing the data in this manner resulted in posttreatment employment rates for Groups 1 and 4 of 64 and 50%, respectively. Significantly more of Group 1 members were employed than either Group 2 ($CS = 3.7$, $df = 1$, $P = 0.05$) or Group 3 ($CS = 5.6$, $df = 1$, $P = 0.01$). Generally, the significant differences in the interview outcome measures were replicated using this strenuous grouping criterion. There was one notable exception: subsequent operations. With this grouping system, 11% of Group 1 patients reported subse-

quent surgery. Whereas originally fewer Group 1 patients had surgery than those in Group 3, this difference now just failed to reach significance (CS = 2.8, df = 1, $P = 0.09$). A revised Table 3 using these grouping criteria is available from the authors upon request.

These results do not change the general conclusion: patients from the UMCPRC program were still found to have significantly greater decreases in pain, fewer physician and hospital visits, as well as greater rates of employment than nonparticipant groups. Furthermore, the logic for reorganizing the data in this manner is debatable. In the authors' opinion the original organization of groups was appropriate and the analogy between surgery and the modification of chronic pain behaviors is incorrect.

A more appropriate analogy is the evaluation of a pharmacological treatment for severe chronic depression. If, for example, a depressed patient does not adhere to the regimen of antidepressant medication for a minimum time period (typically 2 weeks). and therapeutic blood levels are not reached, that patient is not considered in the treatment group. The reasoning is that the result for the noncompliant patient simply does not reflect the effectiveness of that medication. This is not to deny the relevance of the issue of noncompliance. In fact, the relative rate of noncompliance is one outcome dimension with which different antidepressant medications may be contrasted. After all, excessive numbers of patients failing to comply with a treatment is often the first sign of unacceptable side effects.

Questions about attitudes toward treatment were included in the interview to check for unforeseen adverse side effects. The theme of comments in half of the dropouts from the UMCPRC program suggested noncompliance with the physical therapy component of treatment.

The conclusions are the same irrespective which of the two grouping organizations one endorses.

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